

SAIC Suggested Responses to the Independent Science Advisor Recommendations Presented in the November 16, 2007 ISA Report

Note: This handout identifies SAIC's suggested BDCP responses to the Independent Science Advisors (ISA) recommendations presented in their November 16, 2007 report to the Steering Committee. Suggested responses to recommendation numbers 12 and 16-36 were reviewed and revised by the Analytical Tools Technical Team. The "SAIC Suggested Response" column includes a summary statement encapsulating the suggested response, which is shown in bold text. The table includes four categories of summary statements:

- **Determine Later as Plan is Developed:** This suggested response generally applies to ISA recommendations for which sufficient information regarding their practicability for implementation is not available at this time, but that such information may become available during BDCP development.
- **Implement Recommendation:** This suggested response agrees that the recommendation is useful for BDCP development and can be implemented using the current body of knowledge and tools.
- **Implement Recommendation to the Extent Practicable:** This suggested response agrees that the recommendation is useful for BDCP development, but may only be possible to partially implement at this time using the current body of knowledge and tools.
- **Likely not Needed:** This suggestion indicates that the recommendation may not be applicable to fulfilling the anticipated needs of BDCP, or the intent of the recommendation will be fulfilled in a manner other than that suggested by the recommendation.

The rationale for the suggested response follows the bold text. The "Implementing Group" column identifies the BDCP group that SAIC believes is the appropriate entity(ies) to implement the ISA recommendation if adopted by the Steering Committee.

SAIC Suggested Responses to ISA Recommendations

ISA Recommendation	SAIC Suggested Response	Implementing Group
1. Seek further advice on the appropriate geographic scope as the nature of the Covered Activities and conservation measures becomes more defined.	Determine Later as Plan is Developed. Whether it is necessary or appropriate to seek additional scientific advice on the geographic scope and covered species will depend significantly on the content of the conservation program as it is developed. At this juncture, it would be premature to do so. The Steering Committee may chose to revisit the geographic scope of the BDCP following completion of the draft Conservation Strategy and impact assessment to ensure that the scope meets the needs of the Applicants and Steering Committee, and it may elect to seek independent scientific advice on scope and coverage issues at that time.	All groups planning conservation actions
2. Consider the San Joaquin fall-run Chinook salmon as a Covered Species distinct from other Central Valley fall-run Chinook salmon.	Determine Later as Plan is Developed. The BDCP seeks to cover all Chinook salmon runs that pass through and rear in the Delta. The impact assessment would be conducted on each run, and conservation measures would be developed to be run-specific when appropriate.	All groups planning conservation actions
3. Revisit the inclusion of Swainson's hawk, giant garter snake, bank swallow, and other listed taxa as Covered Species once the Covered Activities and conservation strategies, are more fully identified.	Implement Recommendation. This decision would be informed by the range of likely impacts of draft covered activities and conservation measures on other listed species and species that could become listed.	Habitat Restoration Program Technical Team (Habitat Team)
4. Use planning species such as threadfin shad, striped bass, largemouth bass, Brazilian waterweed, overbite clam, and freshwater clam to assess effects of conservation measures on a wider range of ecosystem components and dynamics than the Covered Species represent.	Likely not Needed. SAIC believes that the intent of this recommendation would be fulfilled through application of the DRERIP conceptual models, which are designed to identify the full range of positive and negative effects of covered activities and conservation measures on the Delta ecosystem and covered species.	All groups planning conservation actions
5. Examine how individual species respond to gradients in environmental conditions (and changes in those gradients) to inform assessment of the effects of conservation strategies, rather than using guilds, species communities, or other groupings of convenience.	Implement Recommendation. Responses of individual species to gradients will be addressed in the assessment of covered activity impacts on each species and in the formulation and evaluation of proposed conservation measures for each species.	All groups planning conservation actions, impact assessment (SAIC)

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6. Assess the sensitivity of conservation outcomes to anticipated changes in environmental gradients that will likely arise from sea-level rise, subsidence, climate-change induced alteration in the timing of runoff, human activities, and other processes over the time frame of the Plan and beyond.	Implement Recommendation. The effect of potential future climate changes on projected outcomes would be assessed in the “Expected Outcomes” evaluation for species and communities based on implementation of the conservation plan. Anticipating potential climate changes may also be highly relevant to the development of an adaptive management and monitoring program to provide the BDCP with the flexibility necessary to address climate changes.	All groups planning conservation actions, impact assessment (SAIC)
7. Routinely collect high resolution airborne imagery over the Delta, including lidar, hyperspectral or multispectral, and thermal, to detect and quantify spatial changes in microtopography, surface water temperature, surface turbidity, algal blooms, and aquatic, wetland, and riparian plant species composition and fractional cover.	Determine Later as Plan is Developed. Effectiveness and other monitoring requirements will be identified based on the nature of the covered activities and conservation measures. The BDCP monitoring needs and protocols will be determined by what is necessary to demonstrate compliance with permit conditions, to evaluate the effectiveness of the conservation plan in meeting its goals and objectives, and to inform adaptive management decision making. The importance of collecting these types of data for achieving the purposes stated above would be evaluated during development of the monitoring plan for the Conservation Strategy.	Adaptive Management Technical Team (Adaptive Management Team)—if established
8. Maintain current monitoring programs within the Delta and institute a comprehensive, long-term, Delta-wide monitoring program to provide data on contaminants in sediments, water, and aquatic organisms, including in-Delta diversions and return flows. 9. Refine and expand existing monitoring programs as Covered Activities and Conservation Actions are specified and critical data needs can be identified. 10. Develop an integrated database of monitoring data (e.g., salinity, temperature, nutrients, contaminants) and relevant spatial data layers (e.g., topography, distributions of submerged, emergent, and floating aquatic plant species).	Determine Later as Plan is Developed. SAIC would recommend a response that is similar to suggestion #7. Effectiveness and other monitoring requirements will be developed based on the nature of the covered activities and conservation measures. BDCP monitoring needs and protocols will be determined by what is necessary to demonstrate compliance with permit conditions, to evaluate the effectiveness of the conservation plan, and to inform adaptive management decision making. The need for these types of monitoring programs and data bases will be evaluated during development of the monitoring plan. The monitoring and data management which is undertaken during implementation of the BDCP should be closely coordinated with other ongoing monitoring efforts undertaken by others.	Adaptive Management Team—if established, Implementing Entity
11. Consider relationships between environmental conditions and the Covered Species in a life cycle context.	Implement Recommendation. These considerations are incorporated into DRERIP conceptual models and NMFS’s Viable Salmonid Population concepts. This is consistent with SAIC’s anticipated approach to evaluating the ability of the conservation plan to achieve its biological goals and objectives.	All groups planning conservation actions, impact assessment (SAIC)

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<p>12. Pursue efforts to quantify the contribution of entrainment and other factors to stage-specific mortality rates of Covered Species in order to assess the population-level benefits of offsetting such losses.</p>	<p>Implement Recommendation to the Extent Practicable. Models to comprehensively assess stage-specific mortality rates and population-level benefits are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions. The Analytical Tools Technical Team (Analytical Tools Team) will continue to investigate the availability and utility of tools that are under development for use in BDCP development and implementation. Should such a tool(s) become available during BDCP development, these tools would be used if appropriate.</p> <p>The ATTT is aware of and is evaluating the utility of several tools that can be used to partially assess mortality rates and population level benefits (e.g., empirical data for entrainment/salvage at the SWP/CVP pumping facilities, UnTrim model, San Joaquin River fall-run Chinook salmon population model; Newman-Rice model of Sacramento Basin fall-run Chinook salmon survival). Additionally, during plan implementation the BDCP may participate in development of new/refinement of existing models if deemed necessary to better inform BDCP implementation and adaptive management decision making.</p>	<p>Other Stressors Working Group (Other Stressors WG), Implementing Entity, impact assessment (SAIC)</p>
<p>13. Identify how anticipated changes in environmental conditions, including those associated with Covered Activities and climate change, propagate through populations of Covered Species, and consider how uncertainties regarding future environmental conditions potentially influence population response to Covered Activities.</p>	<p>Implement Recommendation. The effect of potential future climate changes on projected outcomes would be assessed in the “Expected Outcomes” evaluation for species and communities based on implementation of the conservation plan. Taking potential future climate changes into account would be relevant to developing an approach to adaptive management and monitoring to provide the BDCP with the flexibility necessary to address changes, as well as defining Changed Circumstances.</p>	<p>Impact assessment (SAIC)</p>
<p>14. Examine possible bottlenecks at other life stages, including those that occur outside the planning area, rather than only those at the life stage immediately affected by Covered Activities or within the Delta. Bottlenecks at other life stages can modulate the population response to changes in environmental conditions within the Delta.</p>	<p>Implement Recommendation. This is addressed through use of the prioritized species stressors which address in-Delta and outside-of-Delta life stages. It is anticipated that this concept would be addressed in the impact assessment and expected outcomes section of the BDCP document.</p>	<p>Habitat Team</p>

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15. When potential Covered Activities and conservation strategies have been developed, convene a group of science advisors with experience in systems analysis, ecosystem restoration, modeling, population and food web dynamics, and other relevant disciplines to identify appropriate analytical tools and assessment techniques to support conservation planning and implementation in the Delta.	Determine Later as Plan is Developed. The Steering Committee recognizes the importance of this topic and has convened the Analytical Tools Team to address it. It may seek additional science advice during BDCP development based on needs identified by BDCP working groups and technical teams.	Analytical Tools Team/Science Liaisons
16. Use a hydrodynamic model that is based on fundamental physics and that accurately reproduces tidal flows in the system for analysis of Delta transport and dispersion, and particularly for prediction of the effects of proposed management scenarios on hydrodynamics.	Implement Recommendation to the Extent Practicable. The existing DSM2, Particle Tracking, Artificial Neural Network (ANN), and RMA 2D models address aspects of this recommendation. Depending on BDCP planning needs, 3D models developed for specific applications and locations within the Delta may be useful (e.g, the USGS [Jon Burau] model for channels near the DCC). Additionally, during plan implementation the BDCP may participate in development of new/refinement of existing models if deemed necessary to better inform BDCP implementation and adaptive management decision making.	All groups planning conservation actions, impact assessment (SAIC)
17. Use data that span as broad a range of hydrologic and operational conditions as possible to evaluate a model's performance and increase the probability that the model will have sufficient accuracy and precision for evaluating management scenarios.	Implement Recommendation to the Extent Practicable. BDCP will use available models that incorporate the broadest range of hydrologic and operational conditions and best meet the needs of BDCP development and implementation. Prior accuracy and precision testing of existing models will be used as criteria for selecting models for BDCP evaluations. BDCP does anticipate modifying existing models to incorporate BDCP proposed changes in conveyance configuration. BDCP anticipates modifying existing hydrodynamic models to predict hydrodynamic outcomes of a future configuration. Modifications to these models will be reviewed to the extent practicable to ensure that model parameters and assumptions are appropriate.	All groups planning conservation actions, impact assessment (SAIC)

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<p>18. Use models with appropriate dimensionality for the target of the analysis:</p> <p>a. Use a two-dimensional, depth-averaged analysis to predict transport of passive dissolved substances.</p> <p>b. Use a three-dimensional hydrodynamic model to account for both tidal dispersion processes and gravitational circulation associated with salinity intrusion into the Delta, or parameterize gravitational circulation based on local density forcing.</p>	<p>a. Implement Recommendation. This would be accomplished using existing 2D depth-averaged models, such as the Particle Tracking Model component of DSM2.</p> <p>b. Implement Recommendation to the Extent Practicable. There currently is not a 3D model for tidal processes throughout the Delta. Three-D models have been developed for specific applications and locations and may have limited utility depending on BDCP planning and analytical needs. Also the area where gravitational circulation is important is limited; for most areas the uncertainty in other factors (wind, barometric pressure, local diversions, uncertainty in net outflow for example) are much larger than the effects of density stratification.</p> <p>The ATTT will continue to investigate the availability and utility of 3D models that may be under development for use in BDCP development and implementation. Should a Delta-wide 3D model become available during BDCP development, it would be used if appropriate for BDCP planning or analytical needs. Additionally, during plan implementation the BDCP may participate in development of new/refinement of existing models if deemed necessary to better inform BDCP implementation and adaptive management decision making.</p>	<p>All groups planning conservation actions, impact assessment (SAIC)</p>
<p>19. To allow integration of particle or organism behavior into Delta transport models</p> <p>a. Develop a highly resolved three-dimensional hydrodynamic model to produce accurate projections of vertical and lateral variability in channels and junctions.</p> <p>b. Conduct drifter-tracking studies, especially around channel junctions, to evaluate model ability to predict particle trajectories.</p>	<p>Implement Recommendation to the Extent Practicable. New 3D hydrodynamic and particle tracking models are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions). SAIC will use the best available tools during the development and evaluation of the plan to estimate effects of changes in these parameters on covered species (e.g., DSM2, RMA).</p> <p>The Analytical Tools Team will continue to investigate the availability and utility of models that are under development for use in BDCP development and implementation. Should new hydrodynamic and particle tracking models become available during BDCP development, it would be used if appropriate to BDCP development and implementation. Additionally, during plan implementation the BDCP may participate in development of these models if deemed necessary to better inform BDCP implementation and adaptive management decision making.</p>	<p>Other Stressors WG, Conveyance Working Group (Conveyance WG), impact assessment (SAIC)</p>

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<p>20. Apply an array of tools to improve prediction of water temperature at various spatial and temporal scales:</p> <p>a. Develop a correlative analysis of atmospheric conditions and water temperatures to assess large-scale variations in temperature.</p> <p>b. Analyze river inputs and tidal dispersion to predict temperature at finer spatial and temporal resolution.</p> <p>c. If prediction of fine-scale temperature variation between adjacent environments is desired, pursue observational and modeling studies into the effects of shallow, vegetated environments on local temperature dynamics, including the effects of shading along perimeter water.</p>	<p>Implement Recommendation to the Extent Practicable. New temperature models are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions). The BDCP will use the best available tools to assess the effects, if any, of changes in water temperature resulting from covered activities and conservation measures on covered species.</p> <p>The Analytical Tools Team will continue to investigate the availability and utility of temperature models that may be under development for use in BDCP development and implementation. Should new temperature models become available during the BDCP planning process, they would be used if appropriate. Additionally, during plan implementation the BDCP may participate in development of temperature models if deemed necessary to better inform BDCP implementation and adaptive management decision making.</p>	<p>All groups planning conservation actions, impact assessment (SAIC)</p>
<p>21. Evaluate future sediment supply to the Delta from the watershed, and document sediment resuspension characteristics in the Delta, to support the development of an integrated hydrodynamic-sediment transport model to predict sediment concentrations and their variability.</p>	<p>Implement Recommendation to the Extent Practicable. New sediment supply models are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions). SAIC will use the best available tools (e.g., DREIP conceptual models) to evaluate the effects of proposed actions on sediment transport as it relates to covered species and natural communities. Some of the elements of the recommended model(s) (in whole or in part) may be under development by others. The Analytical Tools Team is investigating the status of these efforts to determine if they may be available and useful for informing BDCP planning or would be useful for informing BDCP implementation. Additionally, during plan implementation the BDCP may participate in development of a sediment transport model if deemed necessary to better inform BDCP implementation (e.g., site specific restoration design) and adaptive management decision making.</p>	<p>Habitat Team, Conveyance WG, Implementing Entity</p>

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22. Develop spatially-explicit models of plankton dynamics, and institute monitoring to provide necessary input to these models, to improve prediction of Covered Species responses to changing environmental and food web conditions.	Implement Recommendation to the Extent Practicable. Spatially-explicit plankton models are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions). SAIC will use the best available tools (e.g., DREIP conceptual models) to evaluate the effects of proposed actions on plankton dynamics as they relate to Covered Species and Natural Communities. Additionally, during plan implementation the BDCP may participate in development of a plankton model if deemed necessary to better inform BDCP implementation (e.g., site specific restoration design) and adaptive management decision making.	Other Stressors WG, Habitat Team, Implementing Entity, impact assessment (SAIC)
<p>23. Develop statistical models that relate a) spatial and temporal distributions of environmental factors to life stages of the Covered Species, b) fish movement to environmental factors that cue migration, c) net and tidal flows to migration, and d) abundances of the Covered Species at different life stages to relevant environmental variables.</p> <p>24. When sufficient information is available and the questions to be addressed are tractable to model, develop and apply process models for Covered Species that are built upon the conceptual and statistical models. These process models can be used for predicting short-term, life stage-specific responses and, in some cases, for predicting long-term responses of population dynamics.</p>	<p>Implement Recommendation to the Extent Practicable. New statistical and process models are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions). The ATTT will continue to investigate the availability and utility of tools that are under development for use in BDCP development and implementation. Should such a tool(s) become available during BDCP development, these tools would be used if appropriate.</p> <p>SAIC will use the best available tools (e.g., DREIP conceptual models) to evaluate the effects of proposed actions on these parameters as they relate to Covered Species and Natural Communities. The DRERIP process envisions that the ERP will continually update, modify, and expand the scope of the DRERIP models as new information is developed to achieve the outcomes intended by these recommendations. During implementation, it is anticipated that future versions of DRERIP models as appropriate will be applied to better inform BDCP implementation and adaptive management decision making.</p>	All groups planning conservation actions, Implementing Entity, impact assessment (SAIC)
25. Use hydrodynamic models of the Delta built on fundamental processes to analyze the potential consequences of different future climate change scenarios (e.g., sea-level rise, timing and amount of runoff) on net and tidal flow patterns.	Implement Recommendation to the Extent Practicable. This recommendation would be addressed using existing hydrodynamic models that incorporate the ability to evaluate future climate change scenarios (e.g., CAL-Lite, DSM2). During implementation, it is anticipated that the BDCP would use the best available hydrodynamic models to evaluate the effects of climate change to better inform BDCP implementation (e.g., site specific restoration design) and adaptive management decision making.	All groups planning conservation actions, impact assessment (SAIC)

ISA Recommendation	SAIC Suggested Response	Implementing Group
26. Develop and apply statistical and process models to examine the potential effects of increasing variability in salinity and water temperatures on ecosystem processes and Covered Species in the Delta.	Implement Recommendation to the Extent Practicable. New statistical and process models are unlikely to be developed and available for use in BDCP planning (e.g., development of conceptual restoration actions). SAIC will use the best available tools (e.g., DRERIP conceptual models) to evaluate the effects of these actions if proposed. Should such models become available during BDCP planning, they would be used if appropriate. Additionally, during plan implementation the BDCP may participate in development of these models if deemed necessary to better inform BDCP implementation and adaptive management decision making.	All groups planning conservation actions, Implementing Entity, impact assessment (SAIC)
27. Design a conservation plan based on adaptive management.	Implement Recommendation. Both the USFWS's and NMFS's Five-Point Policy for HCPs and the NCCP Act identify the need for incorporating adaptive management as an element of HCP/NCCPs. Providing for adaptive management is anticipated to be a driving consideration in framing and implementing conservation actions, including adaptive decision making processes and monitoring necessary to inform adaptive management decision making. The BDCP anticipates implementing both passive and active adaptive management as described in the Five-Point Policy, depending on the level of certainty associated with the outcomes of a particular action. The BDCP monitoring program will be specifically designed to provide the information necessary to inform adaptive management decision making.	Adaptive Management Team—if established
28. Identify and implement as soon as possible an administrative mechanism for the Plan to be modified in response to rapidly evolving information, data, and analyses.	Implement Recommendation. The BDCP adaptive management decision making process will be described in the Conservation Strategy chapter of the BDCP document and will include a description of procedures for modifying BDCP implementation that is compliant with ESA section 10 and the NCCP Act. To ensure effective implementation of the plan, SAIC recommends that the administrative process for modifying BDCP implementation in response to new information, data, and analyses be as streamlined as possible consistent with section 10 and the NCCP Act.	Adaptive Management Team—if established
29. Convene a group of science advisors to work with consultants, PREs, and implementing agencies to develop an adaptive management and monitoring strategy to support implementation of the BDCP.	Determine Later as Plan is Developed. It is anticipated that additional science advice will be sought throughout BDCP development based on needs identified by BDCP working groups and technical teams.	Adaptive Management Team—if established